HUMAN

PHYSIOLOGY

FOR MEDICAL STUDENTS

MCQs AND ANSWERS

Part I

- Blood and body fluids
- Autonomic nervous system
- Nerve and muscle
- Circulation and homeostasis
- Respiration
- Digestion (gastrointestinal tract)

By

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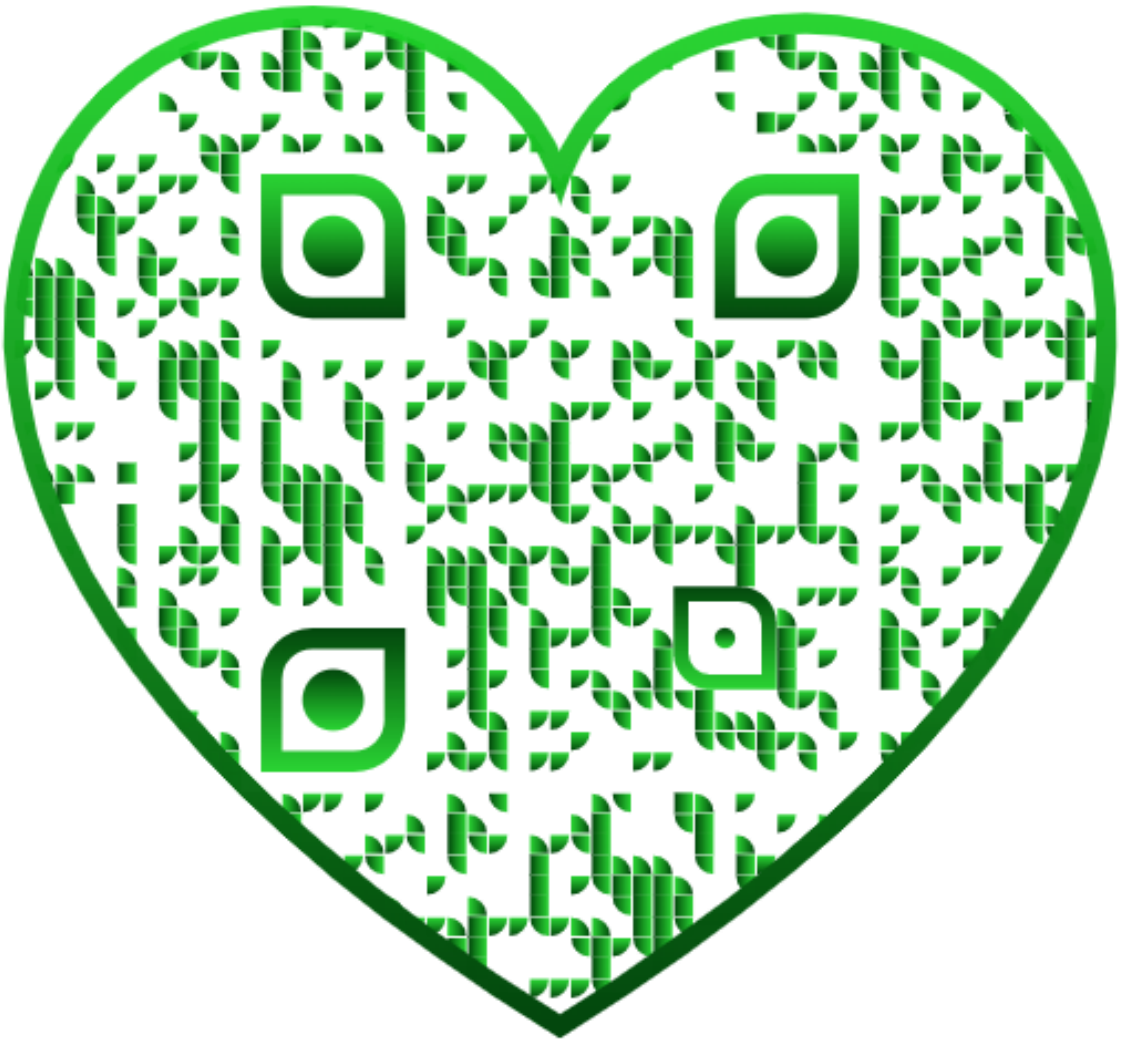

CHAPTER IV

CIRCULATION

For each of the following questions, choose the one most appropriate answer

312. *The cardiac muscle fibres :*
(A) Are unstriated muscle fibres.
(B) Form true syncytium.
(C) Are poor in mitochondria.
(D) Have low resistance bridges and tight gap junctions.
(E) Their T-system is located at the A-I junctions.

313. *About the cardiac conductivity, all the following is true except :*
(A) It is slowest in the A-V node.
(B) It is maximal in the Purkinje fibres.
(C) It is slowest in the ventricular muscle.
(D) It is decreased by vagal stimulation.
(E) It occurs through modified cardiac muscle fibres.

314. *In the A-V conductive system, all the following is true except :*
(A) Conduction is slowest in the N zone of the A-V nodal region.
(B) Conduction is represented in the ECG by the P-R segment.
(C) Conduction is usually difficult in the ventriculo-atrial direction.
(D) Conduction is enhanced by sympathetic stimulation.
(E) Conduction is delayed by about 0.1 second.

315. *About the pacemaker potential, all the following is true except :*
(A) Its amplitude is -80 to -90 mV. (B) It is unstable during rest.
(C) Its slope is decreased by increased permeability to K^+.
(D) The firing level occurs at a potential difference of about -45 mV.
(E) Repolarization is one slow phase.

316. *The phase of cardiac cycle at which the heart is not responsive :*
(A) Is the effective refractory period. (B) Is the relative refractory period.
(C) Is shorter than that in the skeletal muscle.
(D) Extends all through the action potential.
(E) Corresponds to the QRS complex of the ECG.

317. *Sympathetic stimulation causes all the following in the heart except :*
(A) It increases the heart rate.
(B) It decreases the permeability of the S.A.N. to K^+.
(C) It decreases the slope of the prepotential.
(D) It decreases the conduction time in the A.V.N.
(E) It relatively increases the duration of the plateau phase of repolarization.

318. *About activation of the heart, all the following is true except :*
(A) The atrial endocardial cells depolarize before the atrial epicardial cells.
(B) The atrial endocardial cells repolarize before the atrial epicardial cells.
(C) The ventricular endocardial cells depolarize before the ventricular epicardial cells.
(D) The ventricular endocardial cells repolarize after the ventricular epicardial cells.
(E) Depolarization is completed in the base of the heart before the apex.

319. *In the heart, all the following is true except :*
(A) The pericardium limits sudden dilatation of the ventricles.
(B) The left ventricle gives an aid to the right ventricle.
(C) The left atrial wall is thicker than the right atrial wall.
(D) The right atrium is the first part to contract.
(E) The left side of the intervent. septum is depolarized before the right side.

320. *The absolute refractory period (ARP) in the heart :*
(A) Is shorter than that in the skeletal muscles.
(B) Is really effective and not absolute.
(C) Extends till the end of repolarization.
(D) Corresponds to the QRS complex of the ECG.
(E) In the A-V bundle protects the ventricles from high atrial rhythms.

321. *In the atria :*
(A) Depolarization is represented in the ECG by the P-R interval.
(B) Repolarization is represented in the ECG by the T wave.
(C) The epicardial surface repolarizes before the endocardial surface.
(D) Contraction precedes that of the ventricles.
(E) The diastolic period is equal to that of the ventricles.

322. *The fibres of the A-V bundle & its branches :*
(A) Conduct impulses very slowly. (B) Are highly contractile.
(C) Are modified muscle fibres. (D) Are nerve fibres.

323. *The S.A.N. is the normal pacemaker because of its :*
(A) Rate of impulse discharge. (B) Location in the atrium.
(C) Neural control. (D) Muscular structure. (E) Relative position to the A.V.N.

324. *In rapid supraventricular rhythms, all the following is true except :*
(A) The atrial rate may reach 500 beats /minute.
(B) Induction of vagal stimulation may stop the attack.
(C) There is no shift in the electric axis of the heart.
(D) The QRS complex is normal both in duration and configuration.
(E) The atrial to ventricular rate is 1: 1.

325. *A ventricular extrasystole is characterized by :*
(A) Its QRS complex is normal in configuration.
(B) It is usually followed by a compensatory pause.
(C) It usually occurs at the S-T segment of the ECG.
(D) It always indicates a serious heart disease.
(E) When initiated on the left side, it causes left axis deviation.

326. *In complete A-V heart block :*
(A) The ventricles beat at a slow irregular rhythm.
(B) There is an equal number of P waves and QRS complexes in the ECG.
(C) The atria beat at a regular normal rhythm.
(D) The P-R interval is regularly longer than normal.
(E) The QRS complex is normal in configuration but prolonged in duration.

327. *The QRS complex in the ECG :*
(A) Coincides with the atrial and ventricular repolarization.
(B) Represents the electric systole of the heart.
(C) Is increased in voltage in pericardial effusion.
(D) Is normally negative in lead aVR.
(E) In left ventricular hypertrophy, it is -ve in lead I and +ve in lead III.

328. *The pacemaker potential is due primarily to a :*
(A) Slow decrease in K^+ permeability.
(B) Slow increase in K^+ permeability.
(C) Slow decrease in Na^+ permeability.
(D) Rapid increase in Ca^{++} permeability.
(E) Slow decrease in Mg^{++} permeability.

329. *In progressive A-V block, one would expect progressive :*
(A) Prolongation of the C-V interval in the JVP.
(B) Weakening of the ventricular contraction.
(C) Prolongation of the P-R interval in the ECG.
(D) Decrease in the rate of atrial contraction.
(E) Shortening of the interval between atrial and ventricular contractions.

330. *When the pacemaker is located in the ventricular wall :*
(A) The sequence of atrial and ventricular contractions is unaltered.
(B) The heart still pumps with 100 % effectiveness.
(C) The A.V.N. must be non-functioning.
(D) The cardiac output may be adequate for life.
(E) The atria do not beat.

331. *If another area than the SAN becomes the pacemaker, it necessarily implies a :*
(A) Disease of the S.A.N.
(B) Disease of the other area.
(C) Disease of the conducting tissue.
(D) Disease of the neural controlling system.
(E) None of the above.

332. *The cardiac tissue with the slowest rhythmicity is the :*
(A) S.A.N. without vagal tone.
(B) S.A.N. with vagal tome.
(C) Ventricular muscle.
(D) A.V.N.
(E) Purkinje fibres.

333. *The action potential of cardiac muscle differs from that of sk. muscle in :*
(A) It is propagated more slowly.
(B) It is shorter in duration.
(C) It has a higher amplitude.
(D) It has no plateau.
(E) All of the above.

334. *The atrial muscle which repolarizes first is :*
(A) That which depolarizes first.
(B) Located at the S.A.N.
(C) Located near the superior vena cava.
(D) In the region of the cardiac pacemaker.
(E) All of the above.

335. *A-V block may :*
(A) Only exclude every 2nd or 3rd impulse.
(B) Be caused by vagal stimulation.
(C) Be due to rheumatic fever.
(D) Result in dropped beats.
(E) All of the above.

336. *Atrial fibrillation leads to :*
(A) Ventricular fibrillation.
(B) Irregular pulse with pulse deficit.
(C) Nodal rhythm.
(D) Ventricular bradycardia.
(E) All of the above.

337. *The main function of the cardiac Purkinje system is to :*
(A) Increase the speed of impulse conduction through the cardiac muscle.
(B) Prevent premature ventricular beats.
(C) Coordinate the valve movements with myocardial contraction.
(D) Enable all parts of the ventricle to contract simultaneously.
(E) Delay the systole until the ventricles fill.

338. *Atrial repolarization :*
(A) Occurs during ventricular depolarization.
(B) Has no electric properties.
(C) Is represented by the Q wave in the ECG.
(D) Is represented by the descending limb of the P wave.
(E) Produces the T wave.

339. *Parasympathetic stimulation of the heart :*
(A) Increases the excitability of the A.V.N.
(B) Decreases the rate of the A.V. junctional fibres.
(C) Prevents the idioventricular rhythm.
(D) Has no effect on the refractory period of atrial muscle.
(E) All of the above.

340. *Repolarization of the ventricular muscle :*
(A) Begins at the A.V.N.
(B) Begins in the interventricular septum.
(C) Begins in the apical epicardium.
(D) Occurs last at the apex.
(E) Does not occur in the interventicular septum.

341. *Ventricular fibrillation :*
(A) Is not fatal
(B) Cannot be induced by electric currents.
(C) Is associated with increased cardiac output.
(D) May follow atrial fibrillation.
(E) Can be induced by alternating currents during the vulnerable period.

342. *Atrial fibrillation :*
(A) Is fatal if it persists for more than a few days.
(B) Usually changes to atrial flutter.
(C) Interferes only slightly with atrial pumping.
(D) Causes an irregular ventricular rate.
(E) Leads to ventricular fibrillation.

343. *In healthy young adults, the :*
(A) Vagal centre exerts a strong control on the heart rate.
(B) Vagal blockage may double the heart rate.
(C) Vagal control on the heart depends on an afferent input.
(D) All of the above.
(E) None of the above.

344. ***Ventricular fibrillation :***
(A) Is fatal if it persists for more than a few minutes.
(B) Is usually caused by an irritable focus.
(C) Leads to ventricular dilatation.
(D) May result from electrocution.
(E) All of the above.

345. ***Paroxysmal atrial tachycardia :***
(A) Usually indicates myocardial damage.
(B) May be reversed by sympathetic stimulation.
(C) Usually originates from the S.A.N.
(D) Usually occurs as a result of a circus movement.
(E) All of the above.

346. ***Paroxysmal ventricular tachycardia :***
(A) Usually indicates myocardial damage.
(B) Is associated with abnormal QRS complexes.
(C) Predisposes to ventricular fibrillation.
(D) Is more serious than paroxysmal atrial tachycardia.
(E) All of the above.

347. ***When the heart rate is increased :***
(A) The duration of the cardiac action potential is unchanged.
(B) The ratio of systole to diastole is unchanged.
(C) The duration of systole is unchanged.
(D) The duration of diastole is unchanged.
(E) None of the above.

348. ***If one of the ventricles is hypertrophied, it will :***
(A) Depolarize before the other ventricle.
(B) Shift the electrical axis to the involved side.
(C) Depolarize more rapidly than the other ventricle.
(D) Have electric properties identical to those of the other ventricle.
(E) None of the above.

349. ***In the heart, all the following is true except :***
(A) There is more muscle in the left atrium than in the right atrium.
(B) The excitation wave cannot spread directly from the atria to the ventricles.
(C) Contraction normally begins in the right atrium.
(D) The ventricles contract almost simultaneously.
(E) The S.A.N. is the normal pacemaker.

350. ***When the bundle of His is completely interrupted, the :***
(A) Ventricles contract at a rate of 30-40 beats / minute.
(B) Atria beat irregularly.
(C) QRS complexes vary in shape from beat to beat.
(D) P-R interval remains constant from beat to beat.
(E) S.A.N. stops discharging.

351. A ventricular extrasystole :
(A) Is associated with a normal QRS complex.
(B) Is usually not followed by a compensatory pause.
(C) Always indicates a serious heart disease.
(D) May fail to produce a pulse at the wrist.
(E) Indicates ventricular hypertrophy.

352. About the Purkinje tissue cells, all the following is true except :
(A) They are modified myocardial cells.
(B) They are confined to the ventricles.
(C) They are primitive nerve tissue.
(D) They conduct impulses as fast as some nerves.
(E) They excite the interventricular septum before the ventricular walls.

353. About cardiac contractility, all the following is true except :
(A) It depends on the interaction between actin and myosin.
(B) It increases when the serum K^+ rises above normal.
(C) It is lost if the bathing medium is made calcium-free.
(D) It decreases by local application of acetylcholine.
(E) It increases by administration of digitalis.

354. Stimulation of the cardiac sympathetic nerves :
(A) Decreases the slope of the pacemaker potential.
(B) Causes reduction of the coronary blood flow.
(C) Slows the rate of conduction in the A.V.N.
(D) Weakens the cardiac contractility.
(E) Shifts the cardiac function curve upwards and to the left.

355. The sino-atrial node (S.A.N.) :
(A) But not the A.V.N. receives a parasympathetic nerve supply.
(B) Is connected by thin bands of Purkinje fibres to the A.V.N.
(C) Has a faster rate of diastolic depolarization during vagal activity.
(D) Has a faster rate of diastolic depolarization at 39 °C then at 37 °C.
(E) Is a secondary cardiac pacemaker.

356. About the A.R.P. in the heart, all the following is true except :
(A) It lasts approximately as long as the cardiac contraction.
(B) It is longer than the A.R.P. of skeletal muscle.
(C) It is prolonged in damaged myocardial muscle.
(D) It corresponds in time with the whole duration of the action potential.
(E) During it, the heart cannot be stimulated.

357. Under normal conditions, the capillaries :
(A) Contain about 25 % of the total blood volume.
(B) Have a very rapid flow rate.
(C) Have a higher pressure than that in the arterioles.
(D) Are all opened at rest.
(E) Contain about 5 % of the total blood volume.

358. *The Purkinje system has the ability to :*
(A) Amplify the cardiac impulses.
(B) Speed the conduction of the cardiac impulses.
(C) Increase the force of ventricular contractility. (D) Produce coronary V.D.
(E) Selectively block the conduction at the A.V.N.

359. *The left ventricle has a thicker wall than the right ventricle because :*
(A) It is richer in blood supply. (B) It ejects blood through a narrower orifice.
(C) It ejects a greater cardiac output. (D) It ejects blood against a higher pressure.
(E) It contracts at a higher rate.

360. *During the isovolumetric contraction phase of the cardiac cycle :*
(A) The ventricular pressure is decreased. (B) The ventricular volume is increased
(C) The coronary blood flow is decreased. (D) The atrial pressure is unchanged.
(E) No heart sounds are heard.

361. *During the isovolumetric phases of the cardiac cycle :*
(A) All valves of the heart are open.
(B) There is no change in the tension of ventricular muscle.
(C) There is no energy expenditure.
(D) There is a parallel change in both the ventricular and aortic pressures.
(E) There is no external work done.

362. *During the maximum ejection phase, all the following is true except :*
(A) The first heart sound is heard.
(B) The T wave of the ECG is at its peak.
(C) The ventricular volume is decreased.
(D) The ventricular pressure reaches maximum.
(E) The aortic pressure is increased.

363. *The first heart sound :*
(A) Occurs during the protodiastolic phase.
(B) Is occasionally splitted specially during deep inspiration.
(C) Marks the start of diastole.
(D) Is due to opening of the semilunar valves. (E) None of the above.

364. *About the first heart sound, all the flowing is true except :*
(A) It is mainly caused by turbulence set up by closure of the A.V. valves.
(B) It is more longer in duration than the second heart sound.
(C) It coincides with the P wave of the ECG.
(D) It is synchronous with a rise in both atrial and ventricular pressures.
(E) Its frequency (pitch) is lower than that of the second heart sound.

365. *About the second heart sound, all the following is true except :*
(A) It occurs during the rapid (maximum) ejection phase.
(B) It marks the end of systole.
(C) It is shorter and of a higher pitch than the first heart sound.
(D) It is due to closure of the semilunar valves.
(E) It occurs during the isometric relaxation phase.

366. Normally, the closure of the A-V valves is initiated when the :
(A) Atria contract.
(B) Ventricles contract.
(C) Papillary muscles contract.
(D) Ventricles relax.
(E) Ventricular pressure exceeds the atrial pressure.

367. The action potential of the cardiac muscle differs from that of nerves :
(A) In having a negative after potential.
(B) In having a shorter duration.
(C) In having a lower resting potential.
(D) In having a reversed polarity.
(E) None of the above.

368. The first heart sound occurs synchronously with :
(A) Closure of the semilunar valves.
(B) Opening of the A-V valves.
(C) A rise in atrial pressure.
(D) The P wave of the ECG.
(E) A decrease in ventricular pressure.

369. The A wave of the J.V.P. is caused by the :
(A) Pacemaker potential.
(B) Atrial depolarization.
(C) Ventricular repolarization.
(D) Atrial contraction.
(E) Heart block.

370. About the A wave of the J.V.P., all the following is true except :
(A) It is absent in atrial fibrillation.
(B) It is absent in both supraventricular and ventricular premature beats.
(C) It is exaggerated in 3rd degree A-V block causing Cannon waves.
(D) It is exaggerated in tricuspid stenosis.
(E) It is separated from the C wave by a prolonged A-C interval in first degree heart block.

371. The C wave of the J.V.P. occurs :
(A) During the protodiastolic phase of the cardiac cycle.
(B) At the onset of expiration.
(C) During the isovolumetric contraction phase of the cardiac cycle.
(D) Just before the atrial systole.
(E) Just after the dicrotic notch of the aortic pressure curve.

372. About the C wave of the J.V.P., all the following is true except :
(A) It is due to bulging of the tricuspid valve into the right atrium.
(B) It is transmitted from the anacrotic limb of carotid pulsation.
(C) It is more synchronized to the carotid pulse than to the R wave of ECG.
(D) It occurs earlier than the C wave of the right atrial pressure (RAP) curve.
(E) It is followed by a deeper negative wave (X_1) than that of the (RAP) curve.

373. Concerning the radial pulse :
(A) It depends upon the blood flow for its propagation.
(B) It travels at a rate that is slower than that of the blood flow.
(C) Its anacrotic limb is synchronous with the rapid ejection phase.
(D) Its dicrotic notch is synchronous with closure of the aortic valve.
(E) Its dicrotic wave is due to elastic recoil of the aorta.

374. *In aortic valve incompetence :*

(A) There is a systolic murmur heard in the aortic area.
(B) There is a diastolic murmur heard in the mitral area.
(C) The pulse pressure is decreased.
(D) The second heart sound is totally absent.
(E) There is Corrigan pulse (collapsing or water hammer pulse).

375. *A decrease of pressure in the carotid sinus causes :*

(A) A fall in venous pressure.
(B) Tachycardia.
(C) Inhibition of secretion of ADH (antidiuretic hormone).
(D) Accelerated conduction in the atrial muscle.
(E) Decreased peripheral resistance.

376. *The cardiac output divided by the heart rate equals the :*

(A) Cardiac efficiency. (B) Cardiac index. (C) Arterial blood pressure.
(D) Stroke volume. (E) Cardiac reserve.

377. *The Fick's principle for determination of the cardiac output requires measurement of the :*

(A) Oxygen consumption/minute.
(B) Oxygen content of the arterial blood.
(C) Oxygen content of the right ventricular blood.
(D) Arterio-venous oxygen difference. (E) All of the above.

378. *The indicator dilution technique for measuring the cardiac output :*

(A) Does not need mixing of the indicator in the blood at all.
(B) Depends on mixing of the indicator throughout the circulation.
(C) Depends on mixing of the indicator before the point of arterial puncture.
(D) Requires analysis of the blood every 10 seconds.
(E) The first passage of the indicator has equal peaks and durations during both rest and exercise.

379. *Measurement of the cardiac output :*

(A) Cannot be done by echocardiography.
(B) Is not invasive if done by using the Fick's principle.
(C) According to Fick's principle, if the O_2 consumption is doubled the cardiac output is also doubled.
(D) By all techniques, puncture of any artery or vein doesn't vary the results.
(E) Also shows circulatory kinetics if the indicator dilution technique is used.

380. *About the heterometric regulation of the cardiac output :*

(A) The failing heart depends more on it.
(B) It occurs without a change in the end-diastolic volume.
(C) It is prolonged and follows the homeometric regulation.
(D) It is an afterload phenomenon.
(E) It is initiated by increased peripheral resistance.

381. About the homeometric regulation, all the following is true except :
(A) It occurs without a change in the end-diastolic volume.
(B) It is initiated by increased venous return.
(C) It is an afterload phenomenon.
(D) It is prolonged and follows the heterometric regulation.
(E) It is stimulated by arterial hypertension to maintain a normal cardiac output.

382. All the following decrease the cardiac output except :
(A) Increased vagal activity.
(B) Beta-adrenergic receptor blockers.
(C) Rapid paroxysmal tachycardia.
(D) Increased end-diastolic volume
(E) Standing up from the recumbent position.

383. The cardiac output :
(A) Is the combined blood volumes pumped by both ventricles /minute.
(B) Increases when there is overstretch of the ventricle.
(C) Matches the venous return in a normal heart.
(D) Falls when a person with heart failure is given digitalis.
(E) Is determined by the end-systolic pressure x heart rate.

384. The cardiac reserve refers to the increase that can be attained in the :
(A) Cardiac work.
(B) Cardiac output.
(C) Stroke volume.
(D) Heart rate.
(E) All of the above.

385. About the arrangement of the heart & blood vessels, all the following is true except
(A) The left ventricle pumps blood to the tissues in parallel.
(B) A portal vessel connects 2 capillary networks in series.
(C) The left ventricle is a part of both the high pressure and low pressure systems.
(D) The pericardium limits any dilatation of the ventricles.
(E) The left ventricular wall is about 3 times as thick as the right ventricle.

386. About the functions of the different cardiovascular components :
(A) The capillaries are capacitance vessels.
(B) The aorta and pulmonary artery are resistance vessels.
(C) The ventricles are pumping organs.
(D) The arterioles are exchange vessels.
(E) The veins and venules are elastic vessels.

387. The normal pressure in the :
(A) Capillaries is 25 mmHg.
(B) Aorta is 10 mmHg.
(C) Right atrium is 96 mmHg.
(D) Arteries is 0 mmHg.
(E) Veins is 90 mmHg.

388. 80-90 % of the blood volume is normally accommodated in the :
(A) Heart and aorta.
(B) Large arteries and arterioles.
(C) Capillaries (due to their large cross-sectional area).
(D) Veins and venules.
(E) Low pressure system

389. **The velocity of blood flow is minimal in the capillaries due to :**
(A) Their very thin walls.
(B) Their large total cross-sectional area.
(C) The tone of the precapillary sphincters.
(D) Loss of fluid from them by filtration.
(E) The high resistance in the arterioles.

390. **About the Frank-Starling relationship, all the following is true except :**
(A) It implies that tension is a function of length.
(B) It does not reach the limit under normal conditions.
(C) It equalizes both the right and left ventricular outputs on the long term.
(D) It is responsible for maintenance of the cardiac output in afterload conditions.
(E) It is the main operating mechanism in denervated and transplanted hearts.

391. **The buffer nerves :**
(A) Are vagal fibres from both the carotid sinus and aortic arch.
(B) Have no discharge at the normal arterial blood pressure.
(C) Their section results in hypotension.
(D) Have slow rate of discharge when the pulse pressure declines.
(E) If cut during haemorrhage, the arterial blood pressure is increased.

392. **The baroreceptors in the carotid sinus and aortic arch :**
(A) Are equal in their sensitivity to changes in both the mean arterial blood pressure and the pulse pressure.
(B) Play no role during the Valsalva's maneuver and adrenaline apnea.
(C) Their discharge is inhibitory to both the vasomotor centre and C.I.C.
(D) Cannot be reset at higher pressures in cases of chronic hypertension.
(E) Are most effective in the regulation of phasic changes rather than sustained changes in the arterial B.P.

393. **The atrial contraction causes the :**
(A) P wave of the ECG. (B) Incisura of the aortic pressure curve.
(C) A wave of the JVP. (D) Catacrotic limb of the arterial pulse wave.
(E) Dicrotic wave of the arterial pulse curve.

394. **An increased discharge of impulses from the baroreceptors leads to :**
(A) Stimulation of the vasomotor centre.
(B) Stimulation of the cardioinhibitory centre (CIC).
(C) Stimulation of the respiratory centre.
(D) An increase in the secretion of the antidiuretic hormone (ADH).
(E) None of the above.

395. **The importance of the vagal tone is to :**
(A) Increase the arterial blood pressure.
(B) Increase the intestinal secretion.
(C) Decrease the breathing rate.
(D) Decrease the cardiac activity.
(E) Produce V.D. in the skeletal muscles.

396. *In the heart, parasympathetic, stimulation causes all the following effects except :*
(A) Decreased rate of discharge from the S.A.N.
(B) Coronary V.C.
(C) Increased ventricular contractility.
(D) Decreased atrial contractility.
(E) Decreased excitability of the atrial muscle.

397. *In the cardiovascular system :*
(A) The ventricular extrasystoles may not increase the heart rate because of the compensatory pauses.
(B) During respiratory sinus arrhythmia. the cardiac pacemaker becomes the respiratory centre.
(C) The arterioles are the site of exchange of various substances with the tissues.
(D) The atrial muscle fibres interdigitate with the ventricular muscle fibres at the A-V junction.
(E) The cardiac muscle acts as a functional syncytium due to presence of protoplasmic bridges between adjacent cardiac muscle fibres.

398. *In the heart, all the following is correct except :*
(A) The response of the cardiac muscle is all the or none in character.
(B) Ventricular repolarization is indicated by the T wave in the ECG.
(C) The pacemaker tissue has an unstable resting membrane potential.
(D) The A-V nodal delay is prolonged by vagal stimulation.
(E) The inotropic action of catecholamines means their ability to increase the heart rate

399. *During deep inspiration, the arterial pulse usually :*
(A) Increases in amplitude.
(B) Decreases in amplitude.
(C) Shows pulsus deficit.
(D) Shows pulsus alternans.
(E) None of the above.

400. *During systole, the ventricular ejection of blood is :*
(A) Highest in the first third.
(B) Highest in the middle third.
(C) Highest in the last third.
(D) Roughly equal throughout.
(E) Independent of the cardiac rate.

401. *During diastole, the rate of ventricular filling is :*
(A) Constant throughout.
(B) Variable depending on the timing of atrial contraction.
(C) Highest in the first third.
(D) Highest in the middle third.
(E) Highest in the last third.

402. *The third heart sound can be heard during :*
(A) The atrial systole.
(B) Ventricular ejection.
(C) The isometric relaxation phase of the cardiac cycle.
(D) The rapid filling phase of the cardiac cycle.
(E) The P wave of the ECG.

403. *The Einthoven's law of the ECG states that :*
(A) Lead I + Lead II = Lead III.
(B) Lead I + Lead III = Lead II.
(C) Lead II + Lead III = Lead I.
(D) Lead I - Lead II = Lead III.
(E) Lead III - Lead II = Lead I.

404. *The mean electrical axis of the heart may be changed by :*
(A) Changes in the body position. (B) Hypertrophy of one ventricle.
(C) Myocardial infarction. (D) Bundle branch block.
(E) All of the above.

405. *Atrial repolarization is indicated in the ECG by the :*
(A) P wave. (B) QRS complex. (C) U wave
(D) Q-T interval. (E) None of the above.

406. *About the electromechanical period (QS_2), left ventricular ejection time (LVET) and pre-ejection period (PEP), all the following is true except :*
(A) The QS_2 is measured from the onset of QRS to the onset of the 2nd heart sound.
(B) In left ventricular failure, QS_2 is prolonged without a change in the PEP/LVET.
(C) The LVET is the period from rise of the carotid pressure to the incisura.
(D) The PEP is the difference between QS2 and LVET.
(E) The ratio PEP /LVET is normally about 0.35.

407. *Within physiological limits, if the EDV is increased :*
(A) The force of cardiac contraction is increased.
(B) The stroke volume is increased. (C) The cardiac output is increased.
(D) Starling's law is applicable. (E) All of the above.

408. *About the relation between the heart rate and cardiac output (CO) :*
(A) They are always positively correlated.
(B) They are always negatively correlated.
(C) They can be positively correlated at increased heart rates only below 200 /minute.
(D) The CO is increased at very slow heart rates.
(E) The CO remains unchanged in ventricular fibrillation.

409. *The cardiac index is the ratio of the :*
(A) Cardiac output and surface area. (B) Cardiac output and body weight.
(C) Cardiac output and work of the heart. (D) Stroke volume and body height.
(E) Cardiac mechanical efficiency and cardiac O_2 consumption.

410. *The pulse pressure is lowest in the :*
(A) Aorta. (B) Large arteries. (C) Small arteries
(D) Capillaries. (E) Arterioles.

411. *The dicrotic notch (incisura) in the aortic pressure curve is :*
(A) Of no diagnostic value. (B) Coincident with the second heart sound.
(C) Absent in mitral stenosis. (D) Magnified in tricuspid incompetence.
(E) Indicative of heart disease.

412. *The JVP is :*
(A) A damped arterial pulse.
(B) Necessary for proper cardiac filling.
(C) The result of pressure changes in the heart & neighbouring arteries.
(D) Diminished in heart failure.
(E) None of the above.

413. *Within physiologic limits, an increase in the right atrial pressure :*
(A) Decreases the systemic arterial blood pressure.
(B) Increases the cardiac output.
(C) Decreases the intrathoracic pressure.
(D) Decreases the heart rate.
(E) None of the above.

414. *Stimulation of the depressor (cardioinhibitory) area in the medulla oblongata :*
(A) Inhibits the neighbouring V.C.C. causing V.D.
(B) Leads to tachycardia.
(C) Inhibits transmission through the sympathetic ganglia.
(D) All of the above. (E) None of the above.

415. *Venoconstriction is produced in all the following conditions except :*
(A) Haemorrhage. (B) Asphyxia. (C) Carotid artery occlusion.
(D) Lying down. (E) Valsalva maneuver.

416. *Contraction of the splenic capsule in man :*
(A) Decreases the circulating blood volume.
(B) Has no effect on the haematocrit value. (C) Occurs during rest.
(D) Results from parasympathetic stimulation. (E) Is of little significance.

417. *The sympathetic V.C. tone is decreased in response to increased activity of the :*
(A) Carotid sinus baroreceptors.
(B) Medullary chemoreceptors.
(C) Pain receptors.
(D) Carotid body chemoreceptors. (E) All of the above.

418. *If 2 vessels are connected in parallel, their total resistance is :*
(A) More than if they were connected in series.
(B) The sum of their individual resistances.
(C) The average of their individual resistances.
(D) The same as the resistance of the smaller of the 2 vessels.
(E) Less than the resistance of either vessel alone.

419. *In haemorrhagic shock, one would except a decrease in the :*
(A) Cardiac work. (B) Cardiac output. (C) Coronary blood flow.
(D) Oxygen consumption. (E) All of the above.

420. *According to Einthoven's law of the ECG :*
(A) The heart is a good conductor.
(B) The current in the heart flows from base to apex.
(C) If 2 standard ECG leads are recorded, the 3rd can be calculated.
(D) Both ventricles are depolarized simultaneously.
(E) None of the above.

421. *Vasomotor reflexes can be mediated through special areas of the :*
(A) Cerebral cortex. (B) Hypothalamus. (C) Medulla oblongata.
(D) Spinal cord. (E) All of the above.

422. *Opening of the aortic valve occurs when the :*
(A) Atria contract. (B) Papillary muscles contract. (C) Ventricles relax.
(D) Ventricular pressure exceeds the aortic pressure. (E) Ventricles contract.

423. *The velocity of blood flow in the circulatory system is :*
(A) Constant everywhere. (B) Inversely proportional to the cross sectional area.
(C) Highest in the capillaries. (D) Lowest in the aorta.
(E) Always above that at which turbulence develops.

424. *The pulse pressure in a vessel is determined mainly by its :*
(A) Cross sectional area. (B) Anatomical configuration.
(C) Distensibility. (D) Distance from the heart.
(E) Frictional characteristics of the lumen.

425. *The CNS ischaemic reflex (or response) :*
(A) Involves generalized sympathetic discharge.
(B) Is essential in the regulation of normal arterial blood pressure.
(C) Has only a slight effect on the arterial blood pressure.
(D) Is prevented by cerebral hypercapnia. (E) None of the above.

426. *The T wave of the ECG :*
(A) Is a depolarization wave. (B) Is resistant to changes.
(C) Responds to ischaemic but not to toxic changes.
(D) Responds to electrolyte disturbances but not to ischaemia.
(E) None of the above.

427. *The ratio of cardiac work to the total energy expenditure is :*
(A) Called the cardiac mechanical efficiency and is normally 10 -15 %.
(B) Called the cardiac index. (C) Constant even during exercise.
(D) Not changed by autonomic stimulation.

428. *One would expect an increase in the venous pressure in response to :*
(A) An increase in the cardiac output.
(B) An increase in the peripheral resistance.
(C) An increase in the total blood volume.
(D) A decrease in the venous tone.
(E) A change from the standing to the recumbent position.

429. *At rest, the left ventricular work is.....the right ventricular work :*
(A) Equal to. (B) 6 times. (C) 10 times.
(D) 2 times. (E) Any of the above depending on the cardiac output.

430. *The coronary blood flow is predominantly controlled by :*
(A) Sympathetic impulses. (B) Parasympathetic impulses.
(C) Hormones. (D) Autoregulation.

431. *If the pulmonary capillary B.P. is tripled, the filtered fluid is :*
(A) Kept roughly normal. (B) Decreased to 50 % of the normal.
(C) Increased 3 times as normal. (D) Increased 6 times as normal.

432. Following constriction of one renal artery :
(A) The cardiac output is increased.
(B) The blood volume is decreased.
(C) The peripheral resistance is increased.
(D) The heart rate is increased.
(E) The coronary vessels dilate.

433. The resistance to blood flow in small arteries is :
(A) Inversely proportional to the 4th power of its radius.
(B) Independent on the haematocrit value.
(C) Mainly determined by the arterial blood pressure.
(D) Not affected by the blood viscosity.

434. If the cardiac output is doubled, the pulmonary arterial pressure is :
(A) Kept constant.
(B) Becomes 2 times normal.
(C) Becomes 4 times normal
(D) Markedly decreased.

435. Right axis deviation in the ECG is expected following :
(A) Hypertrophy of the left ventricle.
(B) Right bundle branch block.
(C) Left ventricular infarction.
(D) A change of posture from recumbency to standing.
(E) A deep inspiration.

436. The sympathetic fibres that cause V.D. :
(A) Are found in the skeletal muscles.
(B) Originate in the spinal cord.
(C) Are cholinergic in the skeletal muscles.
(D) Are not really dilator fibres in the heart.
(E) All of the above.

437. In association with myocardial damage, one would expect :
(A) Decreased stroke volume and increased heart rate.
(B) Increased stroke volume and decreased heart rate.
(C) Decreased both stroke volume and heart rate.
(D) Increased both stroke volume and heart rate.
(E) Decreased stroke volume and normal heart rate.

438. A decline in the arterial blood pressure causes :
(A) Slowing of the heart rate.
(B) Acceleration of respiration.
(C) Stimulation of the baroreceptors.
(D) Inhibition of the chemoreceptors.
(E) Stimulation of the osmoreceptors.

439. The pressure of the interstitial fluid is normally :
(A) Equal to the capillary pressure.
(B) Slightly greater than the capillary pressure.
(C) Slightly lesser than the capillary pressure.
(D) Slightly negative relative to the atmospheric pressure.
(E) More than the oncotic pressure of the plasma proteins.

440. The blood flow to the skin is characterized by :
(A) It is predominantly under nervous control.
(B) It is highly variable in quantity.
(C) Only a small part is used for nutrition.
(D) It can be shunted through arteriovenous anastomoses.
(E) All of the above.

441. *For treating hypertension, all the following can be used except :*
(A) Depression of the medullary V.C.C.
(B) Ganglion blockers.
(C) Inhibition of the baroreceptors.
(D) Direct depression of the smooth muscle.
(E) Blockage of the norepinephrine effect on the blood vessels.

442. *The P-Q (or P-R) interval of the ECG :*
(A) Varies with the location of the electrodes.
(B) Is related to the A-V conduction time.
(C) Is of no physiologic significance.
(D) Is normally 0.4 second.
(E) Is prolonged in A-V nodal rhythm.

443. *When the CSF pressure increases to the level of arterial blood pressure :*
(A) The CNS ischaemic reflex is initiated.
(B) The arterial B.P. falls.
(C) The individual dies.
(D) The CSF flow stops.

444. *On changing from the recumbent to the upright position :*
(A) The total blood volume tends to decrease.
(B) The renal blood flow decreases.
(C) The venous pressure in the ankle veins increases.
(D) The central venous pressure decreases.
(E) All of the above.

445. *About the changes that occur in the contour of arterial pulse wave as it progresses to the periphery, all the following is true except :*
(A) The rise of the anacrotic limb is more delayed.
(B) The pulse wave becomes more triangular with a steeper upstroke.
(C) The volume is increased.
(D) The incisura becomes slurred and is lost in the peripheral arteries.
(E) The dicrotic wave becomes more prominent and occurs progressively earlier.

446. *About the pulse pressure, all the following is true except :*
(A) It is determined by the stroke volume and arterial elasticity.
(B) It is increased during haemorrhage and after adrenaline injection.
(C) It is increased in aortic incompetence, arteriosclerosis and exercise.
(D) It is decreased at progressively greater distances from the heart.
(E) It is affected by changes in the peripheral resistance.

447. *The level of the mean A.B.P. depends on all the following factors except :*
(A) The cardiac output and the peripheral resistance.
(B) The blood volume and the capacitance of the arterial system.
(C) The thickness of the arterial walls.
(D) The friction of the blood laminae against each other.
(E) The elasticity of the arterial walls.

448. *The normal level of arterial B.P. is kept constant mainly by the activity of :*
(A) The baroreceptors in the carotid sinus and aortic arch.
(B) Other baroreceptors.
(C) The chemoreceptors in the carotid and aortic bodies.
(D) The cerebral ischaemic reflex.
(E) The juxtaglomerular apparatus.

449. All the following mechanisms prevent fall of the arterial B.P. except :

(A) Increased sympatheyic noradrenergic discharge to the heart and arterioles.
(B) Venoconstriction.
(C) Accelerated respiration.
(D) Activation of the sympathetic V.D. cholinergic discharge to skeletal muscles.
(E) Decreased urine formation.

450. Increasing a lowered A.B.P. is helped by all the following except :

(A) Decreasing the vagal tone on the heart.
(B) Relaxation of the arteriolar walls.
(C) Shift of the ECF from the tissue spaces into the capillaries.
(D) The thirst sensation.
(E) Release of renin.

451. The ultrarapid mechanisms that lower a sudden rise of A.B.P. involve :

(A) Fluid shift from the tissue spaces into the intravascular compartment.
(B) Formation of angiotensin II.
(C) Release of catecholamines from the adrenal medullae.
(D) Secretion of vasopressin.
(E) Venodilatation, arteriolar V.D. and bradycardia.

452. In case of haemorrhage, the carotid body chemoreceptors may :

(A) Decrease the heart rate. **(B)** Slow respiration.
(C) Increase the arterial B.P. **(D)** Produce heart block.
(E) Result in ischaemia of the cerebral cortex.

453. In hypovolaemic shock :

(A) The mean circulatory and central venous pressures are normal.
(B) The skin is warm.
(C) Excessive V.C. is life saving.
(D) The cardiac output is lowered with tissue underperfusion.
(E) The ventricular pumping force is compromised (dangerously decreased).

454. Measurement of the arterial B.P. by the auscultatory method :

(A) Is equal to that measured by the palpatory method.
(B) Sometimes shows a silent gap.
(C) Is not influenced by gravity.
(D) Depends on the size of the cuff.
(E) Remains unchanged during the Valsalva's maneuver.

455. During measuring the arterial blood pressure by the auscultatory method, the first sound heard was at 140 mmHg & the sounds disappeared at 95 mmHg. In this case, all the following is true except :

(A) The systolic blood pressure is 140 mmHg.
(B) The pulse pressure is about 32 % of the systolic blood pressure.
(C) The mean arterial blood pressure is 110 mmHg.
(D) There is no silent gap.
(E) The diastolic blood pressure is normal.

456. **About the arterial system, all the following is true except :**
(A) It contains less than 2 % of the circulating blood volume.
(B) It has the function of a hydraulic-filter system.
(C) It acts like a windkessel (changing the intermittent flow to be steady).
(D) It is more elastic near the heart than near the periphery.
(E) It is less elastic in the pulmonary than in the systemic vessels.

457. **About the arterial blood flow, all the following is true except :**
(A) The velocity in the aorta is maximum at systole and may fall below zero (i.e. becoming negative) during diastole.
(B) It is not influenced by the thickness of the vessel wall.
(C) It meets low resistance across the large and muscular arteries.
(D) It has increased tendency for turbulence when the viscosity increases.
(E) It is markedly affected by small changes in the caliber of vessels.

458. **The resistance through blood vessels :**
(A) Increases 16 times when the radius of the vessel is doubled.
(B) Increases in old age due to loss of the arterial wall elasticity.
(C) Is directly proportional to the viscosity and length of the vessels.
(D) Is less in the systemic vessels than in the pulmonary vessels.
(E) Is not affected at all by the haemotocrit due to plasma skimming.

459. **The Reynold's number indicates the :**
(A) Velocity of blood flow.
(B) Volume of blood flow.
(C) Probability of turbulence.
(D) Resistance to blood flow.
(E) Blood viscosity.

460. **Turbulent blood flow is probable in all the following conditions except :**
(A) When the radius of the vessel increases.
(B) When the blood passes through capillaries.
(C) When Reynold's number increases.
(D) When blood becomes less viscous.
(E) When the velocity of blood flow increases.

461. **The velocity of blood flow is :**
(A) Less in the central core than in the peripheral laminae of the blood vessels.
(B) Decreased in a stenosed part of the vessels.
(C) Less in the veins than in the venules.
(D) More in the inferior vena cava than in the aorta.
(E) Measured by the circulation time.

462. **Diminished arterial wall elasticity would increase :**
(A) Both the systolic & diastolic B.P. as well as the pulse pressure.
(B) The cardiac output.
(C) The peripheral resistance.
(D) The cardiac work and velocity of the arterial pulse wave.
(E) The circulation time.

463. *In cases of secondary hypertension, all the following is true except :*
(A) In Conn's syndrome, there is low serum K^+.
(B) In aortic coarctation, the arterial B.P. is high only in the upper half of body.
(C) In Cushing's syndrome, there is low serum Na^+.
(D) In renal hypertension, the renin plasma level is elevated.
(E) Pheochromocytoma is characterized by episodic bouts of hypertension.

464. *Angiotensinogen is :*
(A) A lipoprotein substance.
(B) A diuretic substance.
(C) A powerful V.C. substance.
(D) Activated by renin in the circulation.
(E) Manufactured in the kidneys.

465. *Angiotensin II :*
(A) Is formed by the action of an enzyme on angiotensin III.
(B) Is a decapeptide.
(C) Is released from the juxtaglomerular apparatus of the kidneys.
(D) Acts through stimulating the vasomotor centre.
(E) Is formed due to presence of renin in the circulation.

466. *About angiotensin II, all the following is true except :*
(A) It stimulates the subfornical organ causing thirst sensation.
(B) It is formed mainly in the liver.
(C) It is formed due to renal ischaemia, e.g. in hypotension.
(D) It is the cause of some forms of hypertension.
(E) It directly releases aldosterone from the adrenal cortex.

467. *The angiotensin converting enzyme (ACE) :*
(A) Is normally absent in the plasma and pulmonary epithelium.
(B) Causes arteriolar V.C.
(C) Normally inactivates circulating kinins.
(D) Converts angiotensinogen into angiotensin I.
(E) Inhibitors (e.g. captopril) are useless in treating renal hypertension.

468. *About shock, all the following is true except :*
(A) Cardiogenic shock may be the result of myocardial infarction.
(B) In low resistance shock, the skin is warm.
(C) In irreversible shock, there is venular-capillary tone imbalance.
(D) Septic shock is due to V.D. of the arterioles and precapillary sphincters.
(E) Anaphylactic shock is due to excessive release of serotonin.

469. *About mediators and vasoactive substances, all the following is true except :*
(A) Norepinephrine is a neurotransmitter for arteriolar V.C.
(B) Acetylcholine., VIP and substance P are neurotransmitters for arteriolar V.D.
(C) Renin and angiotensin I produce arteriolar V.C.
(D) Catecholamines, angiotensin II and vasopressin are circulating V.C. substances.
(E) Bradykinin and atrial natriuretic peptide (ANP) are circulating V.D. substances.

470. *About heart failure, all the following is true except :*
(A) There is pulmonary congestion in left-sided heart failure.
(B) The cardiac output does not always reach 5 litres /minute in basal conditions.
(C) The central venous pressure is raised in right ventricular failure.
(D) Pitting edema occurs in the dependent parts of the body.
(E) Treatment with digitalis and diuretics improves the ventricular contractility.

471. *About the central venous pressure, all the following is true except :*
(A) It is the pressure in the large veins outside the right atrium.
(B) It averages 4.6 mmHg.
(C) It is reduced in haemorrhage and increased by sympathomimetic drugs.
(D) It is high in heart failure and treatment with digitalis reduces it.
(E) It is not affected during positive and negative pressure breathing.

472. *Concerning the hydrostatic indifferent point (HIP) :*
(A) It is normally located about 10 inches below the level of the diaphragm.
(B) It is normally located at the level of the heart.
(C) Its position is not changed by water immersion.
(D) At it, the intravascular pressure remains constant at various positions.
(E) It is shifted upwards in haemorrhage and downwards by noradrenaline.

473. *About the mean circulatory pressure (MCP), all the following is true except :*
(A) It reflects the degree of filling of the cardiovascular system.
(B) It is not influenced by the pumping force of the left ventricle.
(C) It is normally about 7 mmHg.
(D) It is increased during haemorrhage and by alpha-adrenergic blocker drugs.
(E) When it is decreased, the HIP moves to a lower position.

474. *The effects of gravity on the venous return are counteracted mainly by :*
(A) The pressure gradient.
(B) Skeletal muscle contraction and increased noradrenergic discharge that constricts the veins.
(C) Arteriolar V. D.
(D) Increased heart and respiratory rates.
(E) Closure of the valves in the peripheral veins.

475. *In the ventricular function curve, all the following is true except :*
(A) It relates the EDV or atrial pressure to a systolic function e.g. cardiac output. SV (stroke volume). SW (stroke work) or PSVP (postsystolic vent. pressure).
(B) It describes the Frank-Starling relationship.
(C) It is unchanged with chronic afterload without heart failure.
(D) It is shifted upwards and to the left during sympathetic stimulation.
(E) It is shifted downwards and to the right in heart failure.

476. *In the vascular function curves, all the following is true except :*
(A) They describe the relation between the venous return (or cardiac output) (ordinate) and the central venous pressure (CVP) or right atrial pressure (abscissa).
(B) They show that when the venous return (or cardiac output) is zero, the CVP (or right atrial pressure) indicates the MCP.
(C) They are shifted upwards and to the right in hypervolaemia.
(D) They are shifted downwards and to the left when the MCP is decreased.
(E) They show that with increases in the venous return (or cardiac output), the CVP (or right atrial pressure) is reduced but not lower than 0 mmHg.

477. *Edema can occur as a result of all the following factors except :*
(A) An increase of the mean capillary pressure from 20 to 37 mmHg.
(B) A decrease of the plasma albumin concentration.
(C) Obstruction of the lymph vessels.
(D) Constriction of the precapillary sphincters.
(E) Cardiac failure.

478. *Within physiological limits, an increase in the right atrial pressure :*
(A) Decreases the systemic arterial B.P. (B) Decreases the intrathoracic pressure.
(C) Increases the cardiac output. (D) Decreases the heart rate.

479. *The blood flow through the left coronary artery :*
(A) Increases in the presence of myocardial hypoxia.
(B) Is greatest during early systole.
(C) Is not regulated by the sympathetic nerve fibres.
(D) Is increased by vagal stimulation.
(E) Is decreased in the reflex response to fall of the arterial blood pressure.

480. *The pulmonary artery B.P. is lower than the systemic arterial B.P. because :*
(A) The output of the right ventricle is less than that of the left ventricle.
(B) The left ventricular wall is thicker than that of the right ventricle.
(C) The aorta is more elastic than the pulmonary artery.
(D) The pulmonary resistance is less than the systemic resistance.

481. *A lymphagogue is a substance which :*
(A) Is used in the treatment of edema.
(B) Increases lymph production.
(C) Produces V.C.
(D) Is used to increase the antibodies in the lymph.
(E) Strengthens the cardiac contractility.

482. *An anginal attack may be precipitated by :*
(A) A fall of systolic B.P. (B) Severe muscular exercise in a normal person.
(C) A fall of diastolic B.P. (D) Taking amyle nitrite. (E) Atrial fibrillation.

483. *The pulmonary blood flow is predominantly controlled by :*
(A) Sympathetic impulses (B) Parasympathetic impulses.
(C) Autoregulation. (D) The pulmonary capillary pressure.
(E) None of the above.

484. *The filtration of fluid from capillaries in a limb :*
(A) Increases when the preceding arteriole constricts.
(B) Increases in haemorrhage.
(C) Decreases by lowering the limb below the heart level.
(D) Increases when the draining vein constricts.
(E) Increases when the plasma albumin concentration increases.

485. *The increased blood flow in active tissues depends mainly on :*
(A) Parasympathetic impulses.
(B) Increased arterial blood pressure.
(C) Increased temperature.
(D) Active dilatation of the true capillaries.
(E) Accumulation of V.D. metabolites.

486. *The open phase of vasomotion in capillaries is due to :*
(A) Oxygen lack and increased carbon dioxide in the tissues.
(B) Increased pressure in the draining vein.
(C) V.C. of the preceding arteriole.
(D) Increased arterial blood pressure.
(E) A local increase of temperature.

487. *The diffusion of various substances through the capillaries is affected by all the following factors except :*
(A) The concentration gradient.
(B) The extent of the capillary surface area.
(C) The hydrostatic capillary blood pressure.
(D) The molecular weights of the substances.
(E) The solubility of the substances in the capillary membrane.

488. *Pitting edema is produced by all the following factors except :*
(A) Renal disease.
(B) Congestive heart failure.
(C) Liver disease and hypoproteinaemia.
(D) Elephantiasis and malignant or inflammatory lymphatic obstruction.
(E) Exposure to subatmospheric pressure.

489. *The plasma colloidal osmotic pressure (=oncotic pressure) is :*
(A) The main filtering force in tissue fluid formation.
(B) In the range of 290 milliosmoles/litre.
(C) Determined only by the albumin content of the plasma.
(D) Equivalent to the osmotic pressure of 0.9 % NaCl solution.
(E) Normally about 25 mmHg.

490. *True capillaries :*
(A) Include the A-V anastomoses, metarterioles and thoroughfare vessels.
(B) Play an active role in determining the blood flow rate through them.
(C) Their blood flow is mainly for nutritional purposes.
(D) Stay closed all the time except during activity.
(E) Contain smooth muscle fibres in their walls.

491. *In the capillaries* :
(A) The blood flow has a more tendency for turbulence than in large vessels.
(B) The tension in their walls is maximal according to Laplace's law.
(C) There are more than one layer of cells in their walls.
(D) Permeability increases during activity due to release of substance H (histamine).
(E) The blood pressure is not influenced by changes in the venous pressure.

492. *About capillaries, all the following is true except* :
(A) The fragility is increased in dilated capillaries.
(B) Their blood flow is pulsatile.
(C) In them, the velocity of blood flow is 0.5-0.7 mm /second.
(D) Their cross-sectional area is about 1000 times that of the aorta.
(E) They offer a greater peripheral resistance to blood flow than the arterioles.

493. *The total cardiac work* :
(A) Is a measure for the total energy expenditure of the heart.
(B) Is equal to 6.8 kg.m /minute under basal conditions.
(C) Is the energy transferred by the heart to the pumped blood volume.
(D) Its kinetic component is negligible and never exceeds 3 %.
(E) Both the pressure and volume fractions of its potential component are equal in their oxygen consumption.

494. *About the cardiac work, all the following is true except* :
(A) It is about 7.14 kg.m /minute in normal conditions during rest.
(B) It can be calculated by multiplying the stroke work x heart rate.
(C) It is only external, so it is zero in the isovolumetric contraction. phase.
(D) The work performed by each ventricle is equal.
(E) The kinetic work increases during muscular exercise.
(F) The left ventricular work is greater than the right ventricular work because the afterload is greater in the former than in the latter.

495. *About the cardiac mechanical efficiency, all the following is true except* :
(A) It is about 15 % at rest, and is increased to about 20 % during exercise.
(B) It is more when the total cardiac work increases by the volume fraction rather than by the pressure fraction.
(C) It increases in intact hearts when the arterial blood pressure rises.
(D) It decreases in intact hearts when the cardiac output is increased as a result of increased sympathetic stimulation.
(E) It is increased in dilated hearts e.g. the athletic and failing hearts.

496. *About the coronary blood flow, all the following is true except* :
(A) It is increased by cholinergic sympathetic V.D. nerves.
(B) It is significant during systole except for the left ventricle.
(C) It is more dependent on the exercise hyperaemia than on neural control.
(D) It is greatest during the isometric relaxation phase of the cardiac cycle.
(E) It is decreased when the diastolic blood pressure is decreased.

497. *The coronary blood flow :*
(A) Depends on the anastomoses that exist between small vessels.
(B) Is increased when the diastolic blood pressure is decreased.
(C) Is increased by vagal stimulation.
(D) Is increased during exercise as a result of the active hyperaemia produced by O_2 lack and accumulation of metabolites in the myocardium specially adenosine.
(E) Results in a high oxygen reserve in the coronary venous blood.

498. *About angina pectoris, all the following is true except :*
(A) It is caused by accumulated pain-producing substances in the myocardium.
(B) It is characteristically produced by effort, exercise or excitement.
(C) It is worsened by drugs that lower the arterial blood pressure e.g. nitrites.
(D) It can be elicited by sudden exposure to cold.
(E) It may be precipitated by anaemia and is relieved by its treatment.

499. *Obstruction of a major coronary artery causes all the following except :*
(A) Bradycardia and hypotension as a result of a vagal reflex.
(B) Certain ECG changes (elevated S-T segments, deep Q waves & inverted T waves).
(C) Release of certain marker enzymes in the blood (e.g. CPK and LDH).
(D) A fatal atrial fibrillation.
(E) It can be diagnosed by invasive coronary angiography.

500. *With a fall in the systemic B.P., the blood flow is markedly decreased in which of the following vascular beds due to V.C. :*
(A) Cerebral. (B) Skin and splanchnic area.
(C) Coronary. (D) Pulmonary.
(E) Skeletal muscles.

501. *About the pulmonary vascular resistance, all the following is true except :*
(A) It decreases during muscular exercise.
(B) It may increase following lung diseases that impair gas exchange.
(C) It decreases in hypoxia and local fall of alveolar PO_2.
(D) Its generalized increase may lead to pulmonary hypertension.
(E) Its chronic increase leads to cor pulmonale.

502. *The pulmonary vascular resistance :*
(A) Is directly related to the metabolic needs of the pulmonary tissues.
(B) Is equal to the systemic vascular resistance.
(C) Is lowered by a neural dilator sympathetic control.
(D) Is increased by local oxygen lack.
(E) Is responsible by autoregulation in stabilizing the pulmonary blood pressure.

503. *About pulmonary hypertension, all the following is true except :*
(A) It is associated with pulmonary artery pressures greater than 30 /15 mmHg.
(B) It may be seen with mitral stenosis.
(C) It occurs with lung diseases that cause obliteration of the small vessels.
(D) It increases the work of heart.
(E) A pulmonary capillary pressure of 10 -15 mmHg leads to pulmonary edema because of the poor lymphatic drainage from the lungs.

504. *A sudden rise of the CSF pressure results in :*
(A) Tachycardia.
(B) Rise of the systemic arterial blood pressure
(C) V.D. of the cerebral vessels.
(D) Complete heart block.
(E) An immediate increase in the cerebral blood flow.

505. *Concerning the circulation in special regions :*
(A) The blood flow in the skin is related to its metabolic needs.
(B) The cutaneous blood flow is decreased by stimulation of the sympathetic cholinergic nerves that supply the sweat glands.
(C) Portal hypertension and ascites occur in association with systemic hypertension rather than with congestive heart failure.
(D) The resistance is much higher in the hepatic arterial capillary bed than in the portal venous capillary bed.
(E) The pressures in the hepatic veins, portal vein and inferior vena cava are equal.

506. *All the following factors increase the blood flow in skeletal muscles during exercise except :*
(A) Increased arterial blood pressure.
(B) Increased sympathetic stimulation of the muscles.
(C) Increased parasympathetic stimulation of the muscles.
(D) Increased circulating epinephrine acting on the beta receptors in the muscle vessels.
(E) Local V.D. produced by accumulation of several vasodilator metabolites.

507. *The lymph flow rate is accelerated by all the following factors except :*
(A) A hydrostatic capillary pressure of 35 mmHg at the venular end.
(B) An interstitial fluid protein concentration of 9.5 gm %.
(C) Increased permeability of the capillary walls.
(D) Injection of hypertonic glucose solutions.
(E) Increased plasma colloid osmotic pressure to 35 mmHg.

508. *The cerebral blood flow :*
(A) Is characterized by its high autoregulation and low variability.
(B) Its main regulatory mechanism is metabolic.
(C) Decreases with the slightest drop of arterial blood pressure.
(D) Is increased during muscular exercise.
(E) Is decreased during sleep.

509. *The cerebral blood flow is decreased in all the following conditions except :*
(A) Hypocapnia.
(B) When breathing pure oxygen at 4 atmospheric pressure.
(C) Increased intracranial tension.
(D) Generalized sympathetic stimulation.
(E) Decreased cardiac output (e.g. due to haemorrhage, shock, ventricular paroxysmal tachycardia, complete heart block or Valsalva's maneuver).

510. About the resistance to blood flow, all the following is true except :

(A) It is inversely proportional to the 4th power of the radius of the vessel.
(B) It is directly proportional to the length of the vessel.
(C) It is directly proportional to the pressure drop along the vessel.
(D) It is independent of the thickness of the vessel wall.
(E) It is independent of the haematocrit.

511. The mean systemic filling (or circulatory) pressure is affected by all the following factors except :

(A) Increased total peripheral resistance.
(B) Contraction of skeletal muscles.
(C) Sympathetic stimulation.
(D) Haemorrhage. **(E)** Posture.

512. Left ventricular hypertrophy occurs in all the following cases except :

(A) Aortic regurgitation. **(B)** Aortic coarctation. **(C)** Mitral stenosis.
(D) Aortic stenosis. **(E)** Chronic systemic hypertension.

513. The cardiac output :

(A) Is necessarily increased when the heart rate increases.
(B) Is reflexly reduced on exposure to a high temperature.
(C) Is about 1/2 of maximum when the subject is at rest.
(D) Can be measured by using the Fick's principle.
(E) Does not change with age.

514. The aortic valve :

(A) Contains 2 semilunar cusps.
(B) Has chordae tendineae.
(C) When incompetent leads to a low systolic blood pressure.
(D) Opens in the isovolumetric contraction phase.
(E) When incompetent leads to a high pulse pressure.

515. In the ECG, all the following is true except :

(A) The P wave coincides with atrial depolarization.
(B) The QRS complex has the same duration as the ventricular systole.
(C) The R wave coincides with depolarization of the apex of the heart.
(D) If the P-R interval is 0.3 second, this indicates impaired A-V conduction.
(E) The T wave is inverted in myocardial ischaemia.

516. The systemic arterial B.P. :

(A) Decreases with age.
(B) Increases invariably with increased heart rate.
(C) Decreases on sudden exposure to cold.
(D) Increases on assumption of the upright posture.
(E) Increases by brain stem asphyxia.

517. Edema occurs in all the following conditions except :

(A) During pregnancy. **(B)** In very hot weather. **(C)** With arteriolar V.C.
(D) In hepatic disease. **(E)** With reduced lymphatic drainage.

518. *Vasodilatation is produced by :*
(A) Vasopressin. (B) Bradykinin. (C) 5-hydroxytryptamine.
(D) Angiotensin I. (E) Norepinephrine.

519. *Vasoconstriction occurs in all the following conditions except :*
(A) Blood loss. (B) Carotid occlusion. (C) Asphyxia.
(D) Lying down. (E) Valsalva's maneuver.

520. *Stimulation of the cardiac symp. nerves produces all the following except :*
(A) Increased oxygen consumption by the heart.
(B) An increase in the slope of the pacemaker potential in the SAN.
(C) A shift to the right of the plot of myocardial contractility versus fibre length.
(D) Increased cardiac output.
(E) Increased coronary blood flow.

521. *During the cardiac cycle, all the following is correct except :*
(A) The thin-walled atria act only as venous reservoirs.
(B) The second heart sound is caused mainly by closure of the semilunar valves.
(C) The period of rapid ventricular filling occurs in the early diastole.
(D) In diastole, the pressure is higher in the aorta than in the left ventricle.
(E) In mid-diastole, the pressure in the right atrium is slightly higher than that in the right ventricle.

522. *There is a predisposition to left ventricular failure with :*
(A) Mitral stenosis. (B) Mitral incompetence.
(C) Pulmonary hypertension. (D) Pulmonary stenosis.
(E) Chronic hypotension.

523. *The functions of lymph include all the following except :*
(A) Return of excess tissue fluid to the blood.
(B) Helping fat absorption in the GIT.
(C) Regulation of the interstitial fluid pressure.
(D) Carriage of filtered plasma proteins back to the circulation.
(E) Generation of lymphocytes and antibodies.

524. *During the normal cardiac cycle :*
(A) The peak pressure in the pulmonary artery is approximately 1/20 of that in the systemic arterial system.
(B) The first sound is due to closure of the mitral and aortic valves.
(C) The atrial systole occurs in the early part of ventricular filling.
(D) The third sound occurs in the rapid filling phase.
(E) The stroke volume at rest is about 200 ml.

525. *The systolic arterial B.P. is :*
(A) Unaffected by changes in posture.
(B) Directly increased by renin.
(C) Affected by the venous return to the heart.
(D) Unaffected by the peripheral vascular resistance.
(E) Lowered by 5-hydroxytryptamine.

526. *The steepest prepotential normally occurs in the :*

(A) Sinoatrial node (SAN). **(B)** Atrioventricular node (AVN).
(C) Bundle of His. **(D)** Purkinje fibres.
(E) Ventricular muscle cells.

527. *In second degree heart block :*

(A) The QRS complexes in the ECG are distorted.
(B) The ventricular rate is slower than the atrial rate.
(C) Ventricular tachycardia may occur.
(D) The stroke volume is decreased.
(E) The cardiac output is increased.

528. *The P-R interval in the ECG corresponds to :*

(A) Atrial repolarization.
(B) Ventricular depolarization.
(C) C-V interval in the JVP.
(D) Atrial depolarization and conduction through the AVN.
(E) Conduction from the SAN to the atrial muscle.

529. *Carotid sinus massage may stop supraventricular tachycardia because it :*

(A) Decreases the sympathetic discharge to the SAN.
(B) Increases the vagal discharge to the SAN.
(C) Increases the vagal discharge to the conducting tissue between the atria & vent.
(D) Decreases the sympathetic discharge to the A-V conducting tissue.
(E) Increases the refractory period of the ventricular myocardium.

530. *The most rapid conduction velocity is present in :*

(A) The SAN. **(B)** The atrial muscle.
(C) The AVN. **(D)** The ventricular muscle.
(E) The Purkinje fibres.

531. *The 4^{th} heart sound is caused by :*

(A) Closure of the semilunar valves.
(B) Vibrations of the ventricular wall during ventricular systole.
(C) Ventricular filling.
(D) Closure of the A-V valves.
(E) Retrograde blood flow into the venae cavae.

532. *The dicrotic notch on the aortic pressure curve is caused by :*

(A) Closure of the aortic valve. **(B)** Rapid filling of the left ventricle.
(C) Opening of the pulmonary valve. **(D)** Closure of the A-V valves.
(E) Elastic recoil of the aorta.

533. *During exercise, a man consumed 1.8 L O_2/ min. His arterial and venous O_2 content were 190 and 134 ml/L respectively. His cardiac output is about :*

(A) 16 L/min. **(B)** 32 L/min. **(C)** 3.2 L/min
(D) 160 ml/min. **(E)** 54 L/min.

534. *The V wave of the JVP is produced by :*
(A) The atrial systole.
(B) Rise of the ventricular pressure during the isovolumetric contraction phase.
(C) Ventricular ejection.
(D) Rise of the right atrial pressure before the tricuspid valve opens.
(E) Opening of the semilunar valves.

535. *All the following are expected to increase the heart rate except :*
(A) Thyrotoxicosis.
(B) Injection of norepinephrine.
(C) Stimulation of the sympathetic nerves that supply the heart.
(D) Section of the vagal efferent nerves that supply the heart.
(E) Bilateral section of the buffer nerves.

536. *In pheochromocytoma, the heart rate would be expected to :*
(A) Increase by the direct chronotropic effect of epinephrine on the heart.
(B) Remain unchanged.
(C) Increase because the raised arterial blood pressure stimulates the baroreceptors.
(D) Decrease because the raised arterial blood pressure stimulates the baroreceptors.
(E) Increase because epinephrine stimulates the peripheral chemoreceptors.

537. *All the following are correctly-paired except :*
(A) Blood loss and hypotension.
(B) Negative g and blackout.
(C) Exercise and increased cardiac output.
(D) Renal artery constriction and increased arterial blood pressure.
(E) Decreased total peripheral resistance and fainting.

538. *During exercise, all the following increase except :*
(A) The respiratory rate.
(B) The stroke volume.
(C) The heart rate.
(D) The total peripheral resistance.
(E) The systolic blood pressure.

539. *All the following are likely to cause hypertension except :*
(A) Increased secretion of the adrenal medulla.
(B) Treatment with the oral contraceptives.
(C) Increased secretion of the thyroid gland.
(D) Increased secretion of the adrenal cortex.
(E) Bilateral renal ischaemia.

540. *After haemorrhage, which of the following takes longest to return to its normal value ?*
(A) The blood pressure.
(B) The plasma volume.
(C) The plasma proteins.
(D) The renin secretion.
(E) The number of red blood cells in peripheral blood.

Answer the following questions by using this key :
(A) If 1, 2 and 3 are correct (B) If 1 & 3 are correct (C) If 2 & 4 are correct
(D) If only 4 is correct (E) If all four are correct

541. *A 10 mmHg increase in the capillary pressure causes :*
(1) A marked increase in fluid filtration from the capillaries. (2) Edema.
(3) Increased lymph flow. (4) Decreased plasma osmotic pressure.

542. *The rise of the arterial B.P. in response to clamping the renal artery :*
(1) Is due to release of renin. (2) Requires several weeks to develop.
(3) May be reversible if the clamp is removed.
(4) Is associated with increased aldosterone secretion.

543. *An increase in the arterial B.P. leads to :*
(1) An increase in the total peripheral resistance.
(2) Increased discharge in the buffer nerves.
(3) Bainbridge reflex.
(4) Bradycardia.

544. *During muscular exercise, the :*
(1) Heart rate increases. (2) Mean arterial blood pressure is decreased.
(3) Venous return is increased. (4) Cardiac work is reduced.

545. *The peripheral venous pressure :*
(1) Is lower than the right atrial pressure. (2) Increases in heart failure.
(3) Is independent of posture. (4) Is higher in the dependent parts of the body.

546. *The blood volume in the lungs :*
(1) Is about 50 % of the total blood volume.
(2) Is predominantly in the pulmonary capillaries.
(3) Is increased by sympathetic stimulation.
(4) Is increased in left ventricular failure.

547. *The arterial B.P. is increased by an increase in the :*
(1) Blood volume. (2) Cardiac output.
(3) Total peripheral resistance. (4) Arterial elasticity.

548. *A marked increase in the pulmonary vascular resistance is caused by :*
(1) Alveolar anoxia. (2) Heparin
(3) Serotonin. (4) Acetylcholine.

549. *The cardiac output is increased by :*
(1) Increased CO_2 content of the coronary blood. (2) Decreased blood pH.
(3) Late heart failure. (4) Infusion of blood.

550. *In comparison with the systemic circulation, the pulmonary circulation :*
(1) Has the same total resistance. (2) Has more distensible vessels.
(3) Is largely regulated by autonomic innervation. (4) Has a lower capillary B.P.

551. *The right atrial pressure is increased by :*
(1) Decreased myocardial contractility. (2) Decreased blood volume.
(3) Increased venous tone. (4) V.C. of small systemic vessels.

552. *In complete heart block :*
(1) Death due to ventricular fibrillation is common.
(2) The ventricular rate is slower than the atrial rate.
(3) Fainting may occur because the atria are unable to pump blood.
(4) Fainting may occur because of the prolonged periods during which the ventricles fail to contract.

553. *Reentry is a common cause of :*
(1) Paroxysmal atrial tachycardia. (2) Paroxysmal nodal tachycardia.
(3) Atrial fibrillation. (4) Sinus arrhythmia.

554. *The ECG changes characteristic of myocardial infarction involve :*
(1) Inversion of the R waves. (2) Short P-R intervals.
(3) Increased amplitude of the T waves.
(4) Appearance of deep Q waves and elevation of the S-T segments in some leads.

555. *During the cardiac cycle :*
(1) Myocardial contraction begins in the right atrium.
(2) The atria contract when the A-V valves are closed.
(3) Excitation of the interventricular septum precedes excitation of the ventricular wall.
(4) Excitation of the epicardium precedes excitation of the endocardium.

556. *The primary determinants of the cardiac output include the :*
(1) Blood volume. (2) Stroke volume. (3) Haematocrit. (4) Heart rate.

557. *Starling's law of the heart :*
(1) Does not operate in the failing heart.
(2) Does not operate when the heart is denervated.
(3) Affects the chronotropic response of the heart.
(4) Affects the inotropic response of the heart.

558. *Valves are present in the :*
(1) Lymphatic vessels. (2) Capillaries. (3) Limb veins. (4) Arterioles.

559. *The velocity of blood flow is :*
(1) Slowest in the capillaries. (2) Faster in the veins than in the venules.
(3) Faster at the centre than at the periphery of a large blood vessel.
(4) Increased in a constricted area of a blood vessel.

560. *The lymph flow towards the heart is helped by the :*
(1) Contraction of the skeletal muscles.
(2) Negative intrathoracic pressure during inspiration.
(3) Pulsations of the neighbouring arteries.
(4) Contraction of the walls of large lymphatic ducts.

561. The activity of the sympathetic nerves supplying the heart is decreased :
(1) During excitement.
(2) When the arterial blood pressure suddenly increases by infusion of norepinephrine.
(3) During haemorrhage.
(4) Immediately after lying down from a standing position.

562. The blood pressure rises as a result of stimulation of :
(1) The nerves from the aortic bodies.
(2) The nerves from the carotid sinus.
(3) The pain nerve fibres from the skin.
(4) The parasympathetic fibres in the vagi nerves.

563. The blood flow is increased by the local action of :
(1) K^+ ions.
(2) CO_2 and H^+ ions
(3) Histamine.
(4) Substance P.

564. Catecholamines acting on alpha adrenergic receptors :
(1) Increase the cardiac contractility.
(2) Increase the rate of discharge of the SAN.
(3) Dilate the coronary arteries.
(4) Increase the arterial blood pressure.

565. The coronary arteries are :
(1) Dilated by adenosine.
(2) Constricted by a direct effect of norepinephrine.
(3) Dilated by an indirect effect of norepinephrine.
(4) Constricted by acetylcholine.

566. The arterioles in the skin dilate by :
(1) Increased body temperature.
(2) Epinephrine.
(3) Bradykinin.
(4) Vasopressin.

567. The important blood reservoirs in the body include :.
(1) The brain.
(2) The splanchnic region.
(3) The spleen.
(4) The lungs.

568. The causes of syncope (fainting) include :
(1) Strong emotions and autonomic insufficiency.
(2) Paroxysmal ventricular fibrillation.
(3) Complete heart block and myocardial infarction.
(4) Pressure on the carotid body.

569. Which of the following normally increases on standing quietly for 1 hour ?
(1) The haematocrit.
(2) The diameter of the thigh.
(3) The plasma renin activity.
(4) The central venous pressure.

570. Which of the following occurs in haemorrhagic shock ?
(1) Increased secretion of vasopressin, aldosterone and catecholamines.
(2) Increased respiratory rate and tachycardia.
(3) Increased entry of fluid into the capillaries from the tissue spaces.
(4) The skin becomes pale and cold.

571. *The cardiac function curve :*
(1) Shows the relation between the arterial blood pressure and heart rate.
(2) Is shifted downwards and to the right by increased sympathetic stimulation.
(3) Is shifted upwards and to the left by negative inotropic substances.
(4) Its physiologic basis is the Frank-Starling's law.

572. *The most permeable capillaries are present in the :*
(1) Brain. (2) Small intestine.
(3) Kidneys. (4) Liver.

573. *Which of the following statements is correct ?*
(1) The pressure difference between the left ventricle and aorta is least during systole.
(2) The injection of tissue plasminogen activator (TPA) is most beneficial within 2 hours after occlusion of a coronary artery.
(3) The blood flow in the endocardial part of the myocardium during systole is less than that in the epicardial part.
(4) The greatest blood flow /100 gm of tissue normally occurs in the kidneys.

574. *The plasma renin activity is most likely to be decreased in :*
(1) Prolonged quiet standing. (2) Congestive heart failure.
(3) Haemorrhagic shock. (4) Essential hypertension.

575. *Which of the following conditions is associated with edema ?*
(1) Increased central venous pressure. (2) Pregnancy.
(3) Massive albuminuria. (4) Elevated arterial blood pressure for a long time.

576. *In a case of hypertension (180 / 120 mmHg) in a young adult male :*
(1) The left ventricular stroke work is decreased.
(2) The cause may be renal artery stenosis.
(3) The cardiac output must necessarily be increased.
(4) A tumour in the adrenal medulla (pheochromocytoma) is a probable cause.

577. *In a case of haemorrhagic shock :*
(1) The heart rate is increased.
(2) The skin is cold and pale.
(3) The central venous pressure is decreased.
(4) The discharge from the baroreceptors is decreased.

578. *In the ECG :*
(1) The P wave is absent in A.F. (atrial fibrillation).
(2) The Q wave may be normally absent.
(3) The T wave is inverted in cases of myocardial ischaemia.
(4) The P-R interval is a good index for the coronary blood flow.

579. *Which of the following statements is correct ?*
(1) Maximum opening of vent. Na^+ channels occurs during the R wave of ECG.
(2) Maximum opening of vent. Ca^{++} channels occurs during the S-T segment of ECG.
(3) Opening of the cardiac K^+ channels causes repolarization of ventricular muscle.
(4) The height of the T wave increases in hyperkalaemia.

580. Which of the following statements is incorrect ?

(1) The height of the R wave in lead V_5 is greater than in lead V_1.
(2) The heart rate in atrial fibrillation is greater than in atrial tachycardia.
(3) The interval between a premature beat and the next normal beat is greater in the ventricles than in the atria.
(4) The slope of prepotential in the SAN is decreased by sympathetic stimulation.

581. About the common types and causes of murmurs :

(1) Both mitral stenosis and incompetence produce systolic murmurs.
(2) Both aortic stenosis and incompetence produce diastolic murmurs.
(3) A systolic murmur at the heart base can be due to aortic incompetence.
(4) A diastolic murmur at the heart apex is often due to mitral stenosis.

582. The lymph flow from the foot :

(1) Increases on rising from the recumbent to the standing position.
(2) Decreases on exercise and when the leg vein valves are incompetent.
(3) Increases when the capillary permeability is decreased.
(4) Increases on massaging the foot.

583. The movement of fluid from capillaries into the tissues is increased by :

(1) A rise in the venous pressure.
(2) A fall in the arterial pressure.
(3) A decrease in the plasma oncotic pressure.
(4) V.C. of the arterioles or closure of the precapillary sphincters.

584. Among the substances that affect the arteriolar diameter :

(1) Angiotensinogen is a pressor (V.C.) hormone in the circulation.
(2) CO_2 and K^+ are V.D. metabolites produced in the tissues.
(3) Prostacycline is a V.C. substance.
(4) ANP is a depressor (V.D.) hormone in the circulation.

585. The plateau phase of the ventricular action potential :

(1) Occurs between the QRS complex and T wave of the ECG.
(2) Corresponds to the R wave of the ECG.
(3) Is coincident with the absolute refractory period.
(4) Is associated with Ca^{++} efflux.

586. During the atrial systole :

(1) The A-V valves are open.
(2) The aortic valve is closed.
(3) The 4^{th} heart sound is recorded.
(4) About 70 % of ventricular filling occurs.

587. According to the myogenic theory of autoregulation, increasing the arteriolar blood pressure leads to :

(1) Decreased tissue blood flow.
(2) Increased tissue blood flow.
(3) Decreased vascular tone.
(4) Increased vascular resistance.

588. *Which of the following relationships is correct ?*
(1) B.P. = C.O. x P.R. = H.R. x S.V. x P.R. (C.O.= cardiac output).
(2) C.O. = S.V. x H.R. = B.P. / P.R. (H.R.= heart rate).
(3) H.R. = B.P. / S.V. x P.R. (S.V. = stroke volume).
(4) P.R. = B.P. x S.V. x H.R. (P.R.= peripheral resistance).

589. *The cardiac output is likely to decrease :*
(1) During stimulation of the sympathetic nerves that supply the heart.
(2) By increasing the end-diastolic volume.
(3) On cutting the vagal nerve fibres that supply the heart.
(4) On standing up from the recumbent position.

590. *An infusion of norepinephrine would lead to :*
(1) Decreased mean arterial blood pressure.
(2) Increased firing in the buffer nerves.
(3) Decreased stroke volume.
(4) Reflex bradycardia.

591. *About the veins and venous pressure :*
(1) The veins act as blood reservoir.
(2) The venous pressure in the foot becomes lower on walking.
(3) About 2/3 of the total blood volume is found in the systemic veins.
(4) Subatmospheric venous pressures are never found outside the thoracic cavity.

592. *Which of the following is required for measuring the cardiac output by using the direct Fick's principle ?*
(1) The total O_2 consumption/minute.
(2) The ventilation perfusion ratio.
(3) The arterial and venous O_2 concentrations.
(4) The diffusing capacity of the lungs for O_2.

593. *Acute left ventricular failure is accompanied by :*
(1) An abnormal J.V.P. and liver enlargement.
(2) Ankle edema.
(3) An increase in the systemic arterial blood pressure.
(4) Pulmonary hypertension and pulmonary edema.

594. *The conduction in the A-V node :*
(1) Is represented by the P-R interval in the ECG.
(2) Is not changed in A-V nodal rhythm.
(3) Has maximum slowing in the N zone.
(4) Is prolonged by sympathetic stimulation.

595. *In first degree heart block, there is :*
(1) A more rapid atrial rate than ventricular rate.
(2) Inverted P waves.
(3) Prolongation of the QRS duration.
(4) Prolongation of the P-R intervals.

596. *Which of the following statements is correct ?*
(1) The augmented limb leads measure the potential difference between 2 limbs.
(2) Leads V_1 to V_6 are unipolar leads recording activity in the horizontal plane.
(3) Lead aVR is an augmented bipolar lead.
(4) Leads V_1, V_2 and aVR are normally negative.

597. *The Wolff-Parkinson-White syndrome is characterized by :*
(1) Presence of an additional bundle between the atria and ventricles.
(2) Accelerated A-V conduction causing short P-R intervals.
(3) Liability to development of paroxysmal atrial tachycardia.
(4) Prolongation of the P-R intervals till one beat drops.

598. *A ventricular premature contraction :*
(1) Is often preceded by a normal P wave.
(2) Is usually followed by a compensatory pause.
(3) Gives rise to a QRS complex that is normal in duration, voltage and configuration.
(4) Is followed by a repolarization vector that is opposite in direction to the depolarization vector.

599. *The Frank-Starling law (preload) involves changes in the :*
(1) Peripheral resistance. (2) Cardiac metabolism.
(3) Action potential. (4) Length of sarcomeres.

600. *The QRS vector is normally :*
(1) + ve in L_{II} and + ve in aVR. (2) + ve in L_{II} and - ve in aVF.
(3) + ve in L_{II} and - ve in lead III. (4) + ve in L_{II} and + ve in aVF.

601. *During the isometric contraction phase of the cardiac cycle :*
(1) The entry and exit valves are closed.
(2) The cardiac muscle does not expend any energy.
(3) The aortic pressure is steadily decreasing.
(4) The blood flow to the subendocardial part of the left vent. markedly increases.

602. *The SAN :*
(1) Is connected by Purkinje fibres to the AVN. (2) Is the normal cardiac pacemaker.
(3) Shows faster diastolic depolarization by acetylcholine.
(4) Shows faster diastolic depolarization by epinephrine and rise of the body temp.

603. *During the reduced ejection phase of the cardiac cycle :*
(1) The left ventricular pressure is constant.
(2) The left atrial pressure is decreased.
(3) The aortic pressure rises more than in the maximum ejection phase.
(4) The A-V valves are closed.

604. *About the relation of ECG to the events of the cardiac cycle :*
(1) The first heart sound coincides with the P wave.
(2) The second heart sound coincides with the QRS complex.
(3) The T wave is produced by ventricular depolarization.
(4) The Q-T interval equals the duration of ventricular systole.

605. *During muscular exercise :*
(1) The muscle blood flow increases due to release of V.D. metabolites.
(2) There is increased parasympathetic V.D. discharge to the muscles.
(3) The total peripheral resistance decreases.
(4) The pulmonary vascular resistance increases.

606. *The Valsalva maneuver :*
(1) Is forced inspiration against a closed glottis.
(2) Increases the intrathoracic pressure.
(3) Leads to increased right and left ventricular outputs.
(4) May be accompanied by tachycardia.

607. *Which of the following statements is correct ?*
(1) Angina pectoris can be diagnosed by the stethoscope.
(2) An elevated arterial blood pressure is always associated with tachycardia.
(3) A pulse rate of 40 /minute always suggests heart block.
(4) Atrial fibrillation results in an irregular pulse.

608. *An attack of fainting (syncope) :*
(1) May occur during shaving or micturition (in males).
(2) Is due to bradycardia and V.D. of the skeletal muscle arterioles.
(3) Can occur during muscular exercise.
(4) Consciousness is resumed in a few minutes if the patient is kept in the upright position.

609. *In the pulmonary circulation :*
(1) The peripheral resistance is less than that in the systemic circulation.
(2) The blood viscosity is more than in the systemic circulation.
(3) The stroke work of the right ventricle is less than that of the left ventricle.
(4) The stroke volume of the right ventricle is more than that of the left ventricle.

610. *During prolonged standing :*
(1) The CVP increases. (2) The venous pressure in the lower limbs increases.
(3) Pitting edema in the face may be observed. (4) Syncope may occur.

611. *Left-sided heart failure is diagnosed if there is :*
(1) Anacrotic pulse. (2) High central venous pressure (CVP).
(3) An enlarged liver. (4) Dyspnea on exertion and left axis deviation of the heart.

612. *Which of the following cardiovascular reflexes and effects are inter-related ?*
(1) Bezold-Jarisch reflex and bradycardia.
(2) Marey's reflex and regulation of the arterial blood pressure.
(3) Bainbridge reflex and tachycardia.
(4) Cushing's reflex and regulation of the coronary blood flow.

613. *Corrigan (water hammer) pulse is commonly encountered in :*
(1) Atherosclerosis. (2) Hypothyroidism.
(3) Aortic incompetence. (4) Polycythaemia.

614. *Which of the following diseases causes left axis deviation :*

(1) Systemic hypertension. (2) Aortic stenosis.
(3) Aortic incompetence. (4) Pulmonary hypertension.

615. *Appearance of deep Q waves in ECG indicates :*

(1) Heart block. (2) Presence of an injury current.
(3) Cardiac ischaemia. (4) Cardiac infarction (necrosis).

616. *In ECG, left ventricular changes are best detected by examining leads :*

(1) V_1 and V_2. (2) L_1 and aVR.
(3) L_{11} and aVF. (4) V_5 and V_6.

617. *Which of the following statements is correct ?*

(1) The vulnerable period coincides with the mid point of the T wave.
(2) An electric axis of the heart pointing along -35° suggests left vent. hypertrophy.
(3) Reentry (circus movement) best develops during the vulnerable period.
(4) The atrial depolarization wave in ECG is obliterated by ventricular repolarization.

618. *In complete heart block, there is :*

(1) Prolongation of the P-R intervals in the ECG.
(2) Regular atrial beating.
(3) An equal number of P waves and QRS complexes in the ECG.
(4) Normal QRS configuration and complete atrio-ventricular dissociation.